



Innovation @ WSTF 2011

Machining Sabots Using Peanut Oil and Isopropyl Alcohol



Sabot Machined Normally is Opaque with Ridges and Imperfections



Sabot Machined with Peanut Oil and Isopropyl Alcohol is Crystal Clear and No Imperfections

When sabots were fracturing while shooting precise targets at hypervelocity speeds and becoming part of the holes in the target, the White Sands Test Facility (WSTF) Remote Hypervelocity Test Facility worked with WSTF's problem-solving Precision Machining and Fabrication Shop personnel to find a better method for machining sabots.

The rougher the outside of the machined polymer sabots, the more likely the sabot would sabotage the shots. Finding a tested technique for precision-machining polymers using a mixture of vegetable oil and isopropyl alcohol (IPA), the machine shop worked to perfect the technique to meet WSTF's needs. Experiments proved peanut oil worked better than vegetable oil, so the machine shop mixed ratios of peanut oil and IPA until the exact formula was created to machine crystal-clear, blemish-free sabots measuring within .5 one thousandths of an inch of the needed tolerance.

Machining polymers with a peanut oil and IPA mixture does two things: the oil keeps the heat of the cutting process from distorting the shape, and the IPA thins the oil and speeds up the process. The IPA also evaporates quickly, which is an endothermic effect and also helps to reduce tooling heat. The result is a crystal-clear, precision-machined sabot that doesn't fracture at hypervelocity speeds.

From a cost savings viewpoint, the precisely machined sabot shots are not rejected, saving \$1,000–\$2,000 per rejected shot and \$2,000–\$4,000 per target. These sabots are now in use at the Hypervelocity Test Facility, saving time and reducing costs.

